

**Abstract**

A particle-optical apparatus comprising a sample holder for receiving a sample, a particle source embodied to produce a primary  
5 beam of first electrically charged particles along an optical axis for the purpose of irradiating the sample, first detector embodied to detect second electrically charged particles that emanate from the sample as a result of the irradiation thereof, a detection space that at the least is formed by the sample holder and the first detector, and an immersion lens  
10 embodied to produce a magnetic field for the purpose of focusing the primary beam in the vicinity of the sample holder. The first detector are embodied to produce an electric field in the detection space, and the detection space is embodied to comprise a gas.

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